



## **ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM**

### **PERMIT FACT SHEET – FINAL**

Permit Number: **AK0021547**

**City of Cordova Wastewater Treatment Plant**

## **ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

### **Wastewater Discharge Authorization Program**

**555 Cordova Street**

**Anchorage, AK 99501**

Public Comment Period Start Date: April 26, 2017

Public Comment Period Expiration Date: May 26, 2017

[Alaska Online Public Notice System](#)

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Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit to

### **CITY OF CORDOVA WASTEWATER TREATMENT PLANT**

For wastewater discharges from

City of Cordova Wastewater Treatment Plant  
200 Orca Inlet  
Cordova, AK 99574

The Alaska Department of Environmental Conservation (the Department or DEC) proposes to reissue an APDES individual permit (permit) to the City of Cordova. The permit authorizes and sets conditions on the discharge of pollutants from this facility to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility and outlines best management practices to which the facility must adhere.

This fact sheet explains the nature of potential discharges from the City of Cordova Wastewater Treatment Plant and the development of the permit including:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions
- technical material supporting the conditions in the permit
- proposed monitoring requirements in the permit

## **Appeals Process**

The Department has both an informal review process and a formal administrative appeal process for final APDES permit decisions. An informal review request must be delivered within 15 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director, Division of Water  
Alaska Department of Environmental Conservation  
410 Willoughby Street, Suite 303  
Juneau, AK 99811-1800

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review.

See <http://www.dec.state.ak.us/commish/InformalReviews.htm> for information regarding informal reviews of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department within 30 days of the permit decision or a decision issued under the informal review process. An adjudicatory hearing will be conducted by an administrative law judge in the Office of Administrative Hearings within the Department of Administration. A written request for an adjudicatory hearing shall be delivered to the Commissioner at the following address:

Commissioner  
Alaska Department of Environmental Conservation  
410 Willoughby Street, Suite 303  
Juneau AK, 99811-1800

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See <http://www.dec.state.ak.us/commish/ReviewGuidance.htm> for information regarding appeals of Department decisions.

## Documents are Available

The permit, fact sheet, and related documents can be obtained by visiting or contacting DEC between 8:00 a.m. and 4:30 p.m. Monday through Friday at the addresses below. The permit, fact sheet, and other information are located on the Department's Wastewater Discharge Authorization Program website:

<http://www.dec.state.ak.us/water/wwdp/index.htm> .

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 410 Willoughby Avenue, Suite 310 Juneau, AK 99801 (907) 465-5180
Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 43335 Kalifornsky Beach Rd. - Suite 11 Soldotna, AK 99669 (907) 262-5210	

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## 1.0 APPLICANT

This fact sheet provides information on the Alaska Pollutant Discharge Elimination System (APDES) permit for the following entity:

Name of Facility:	City of Cordova Wastewater Treatment Plant
APDES Permit Number:	AK0021547
Facility Location:	200 Orca Inlet, Cordova, AK 99574
Mailing Address:	PO Box 1210, Cordova, AK 99574
Facility Contact:	Mr. Joel Felix, Operator

The map in Appendix A to the Fact Sheet shows the location of the treatment plant and the discharge location.

## 2.0 FACILITY INFORMATION

The City of Cordova (City) is located on the southeast side of Prince William Sound in the Gulf of Alaska. The community was built on Orca Inlet at the base of Eyak Mountain. It lies 52 air miles southeast of Valdez and 150 miles southeast of Anchorage. The City owns, operates, and maintains the Wastewater Treatment Plant (WWTP) that provides secondary treatment of wastewater prior to discharge into Orca Inlet. A map of the location is included in Figure 1. The WWTP is part of a sanitary sewer system that receives domestic wastewater from residential and commercial sources. There are no significant industrial sources. The facility is an aerated activated sludge package plant that consists of a grit chamber, aeration tanks, clarifier, sludge digester, and a chlorine contact basin. The WWTP was installed in 1974 and currently serves a population of approximately 2,386 (2016 Department of Commerce, Community & Economic Development Commissioner Certified Population). The facility's design criteria are as follows:

Design flowrate	0.7 million gallons per day (mgd)
Design 5-day Biochemical Oxygen Demand (BOD <sub>5</sub> ) removal	85%
Design Suspended Solids (TSS) removal	85%

The permittee disposes of approximately 530 dry metric tons of biosolids per year at a surface disposal site located approximately 15 miles southeast of the City at Sheridan Glacier Road. The solid waste disposal facility is owned by the City and is currently operating under a State of Alaska solid waste disposal permit (SW2A005-020) that expires June 6, 2020.

Identified pollutants of concern include the conventional domestic wastewater pollutants BOD<sub>5</sub>, TSS, pH, temperature, dissolved oxygen (DO), ammonia, and fecal coliform bacteria. Total residual chlorine (TRC) is also a pollutant of concern as it is used for disinfection of wastewater to treat pathogens. The permit additionally contains monitoring requirements for enterococci bacteria.

### 2.1 Permit Background

In October 1974, the Environmental Protection Agency (EPA) issued the City a National Pollutant Discharge Elimination System (NPDES) permit that contained primary treatment requirements for the disposal of domestic wastewater. This permit expired in November of 1976 and was reissued in May 1977, with a compliance schedule to achieve secondary treatment standards by July 1977. This permit was reissued by EPA in July 1983. Subsequent permit reissuances occurred in January 1990, January 1996, and December 2001.

In October 2008, the Alaska Department of Environmental Conservation (the Department or DEC) received approval from EPA to administer the NPDES Program in the State of Alaska. DEC issued an Alaska Pollutant Discharge Elimination System (APDES) individual permit to the City for the discharge of secondary treated domestic wastewater to Orca Inlet on May 27, 2011. The existing permit expired on June 30, 2016 and was administratively extended on April 1, 2016.

### 3.0 COMPLIANCE HISTORY

DEC reviewed Discharge Monitoring Reports (DMRs) from September 2010 to August 2016 to determine the facility's compliance with effluent limits. Table 1 summarizes the permit limit exceedances during this time period.

The State issued a Compliance Order by Consent (COBC) in May 2011 that required the City to perform corrective actions to ensure that the treatment facility achieved compliance with the provisions of the permit, Clean Water Act (CWA), and State laws and regulations. The COBC included a schedule for the City to submit draft and final facility plans, Construction Notice-to-Proceed, and progress reports. The COBC specified that the construction of modifications required to provide disinfection be completed by August 23, 2013. In order to comply as soon as possible, the City agreed to complete corrective measures to achieve full compliance with the fecal coliform bacteria limits on or before September 30, 2013. The permittee achieved disinfection within the required timeframe and was in good standing with the requirements of the COBC.

The Cordova WWTP was inspected on September 30, 2015 and the subsequent inspection report identified six permit violations (DEC, 2015):

1. Two BOD<sub>5</sub> limit exceedances (see Table 1 below);
2. A non-operational transducer used to record effluent flows;
3. Identification of late submissions of DMRs;
4. The Quality Assurance Project Plan (QAPP) was not located onsite;
5. Documentation that the Operation and Maintenance (O & M) plan be reviewed annually was not available onsite; and
6. The wastewater operator was not properly certified in accordance with State regulations.

The applicant resolved these violations satisfactorily and within the timeframe required by the compliance letter (DEC 2015).

Section 8.4 of the fact sheet summarizes bypass events. Bypass events are prohibited by 18 AAC 83.415 and are discussed in Section 2.6 of Appendix A Standard Conditions of the permit.

Table 1 summarizes the permit limit exceedances from July 2011 through August 2016.

**Table 1: Permit Limit Exceedances**

Parameter	Monthly Average Violations	Daily Maximum Violations	Weekly Average Violations
Flow	1	0	0
% Removal - TSS	1	0	0
BOD <sub>5</sub>	0	1	1
TSS	0	3	0
Fecal coliform bacteria	0	1	1

### 4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

#### 4.1 Basis for Permit Effluent Limits

The CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits (TBEL) or water quality-based effluent limits (WQBEL). TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the water quality standards (WQS) of a water body are met. WQBEL may be more stringent than TBELs.

The basis for the proposed effluent limits in the permit is provided in APPENDIX B. The permit contains a combination of both TBELs and WQBELs. The Department first determines if TBELs are required to be incorporated into the permit. TBELs for publicly owned treatment works (POTWs), which apply to the publicly owned WWTP, are derived from the secondary treatment standards found in Title 40 Code of Federal Regulations (40 CFR) §133.102 and 40 CFR §133.105, adopted by reference at 18 AAC 83.010(e). The basis for the effluent limits in the permit are provided in APPENDIX B.

Effluent limits new to this permit issuance are monthly and weekly average limits for fecal coliform (FC) bacteria, a revised daily maximum limit for FC bacteria, and new monthly average and daily maximum effluent limits calculated for total ammonia, as Nitrogen (N).

Table 2 summarizes the proposed effluent limits and monitoring requirements.



**Table 2. Outfall 001: Effluent Limits and Monitoring Requirements**

Parameter	Effluent Limits					Monitoring Requirements		
	Units <sup>a</sup>	Daily Minimum	Monthly Average	Weekly Average	Daily Maximum	Sample Location	Sample Frequency	Sample Type
Total Discharge Flow	mgd	N/A	0.7	N/A	Report	Effluent	Daily or Continuous	Recorded
Biochemical Oxygen Demand (BOD <sub>5</sub> ) <sup>b</sup>	mg/L	N/A	30	45	60	Influent and Effluent	1/Week	24-hour Composite <sup>c</sup>
	lbs/day	N/A	175	263	350			
Total Suspended Solids (TSS)	mg/L	N/A	30	45	60	Influent and Effluent	1/Week	24-hour Composite <sup>c</sup>
	lb/day	N/A	175	263	350			
BOD <sub>5</sub> minimum percent (%) removal: 85% <sup>d</sup>			TSS minimum percent (%) removal: 85% <sup>d</sup>			Influent and Effluent	1/Month	Calculated <sup>d</sup>
Fecal Coliform (FC) Bacteria	FC / 100 mL	N/A	200 <sup>e</sup>	400 <sup>e</sup>	800 <sup>f</sup>	Effluent	1/Week	Grab
pH	SU	6.5	N/A	N/A	8.5	Effluent	Daily	Grab
Temperature	°C	N/A	Report	N/A	N/A	Effluent	Daily	Grab
Dissolved Oxygen	mg/L	6.0	N/A	N/A	17	Effluent	Daily	Grab
Total Ammonia, as N	mg/L	N/A	9.88	N/A	27.81	Effluent	1/Month	24-hour Composite <sup>c</sup>
Enterococci	cfu/ 100 mL	N/A	Report <sup>e</sup>	N/A	Report	Effluent	1/Month May through September <sup>g</sup>	Grab
Total Residual Chlorine (TRC) <sup>h</sup>	mg/L	N/A	0.05 <sup>i</sup>	N/A	0.10 <sup>f, i</sup>	Effluent	Daily	Grab

**Footnotes:**

- mgd = million gallons per day; mg/L = milligrams per liter; lbs/day = pounds per day; % = percent; FC/100 mL = fecal coliform bacteria per 100 milliliters; #/100 mL = number per 100 milliliter; SU = standard pH units; °C = degree Celsius
- Effluent limits are based on a design flow of 700,000 gallons per day (0.7 mgd).
- Composite samples must consist of at least eight grab samples collected at equally spaced intervals and proportionate to flow so that composite samples reflect influent/effluent quality during the compositing period.
- Minimum percent removal = [(monthly average influent concentration in mg/L – average monthly effluent concentration in mg/L) / (average monthly influent concentration in mg/L)] x 100. The monthly average percent removal must be calculated using the arithmetic mean of the influent value and the arithmetic mean of the effluent value for that month. Calculation required monthly.
- If more than one fecal coliform bacteria sample or enterococci bacteria sample is collected within a 30-day (monthly) or 7-day (weekly) period, the average result must be reported as the geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of “n” quantities is the “nth” root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is  $(100 \times 200 \times 300)^{1/3} = 181.7$ . See Appendix C for calculation.
- Reporting is required within 24 hours if the daily maximum limit is violated. See Appendix A, Section 3.4.3.3.
- One sample shall be collected each month, May through September, on the same day as the FC bacteria sample is collected.
- Total residual chlorine monitoring required only if chlorine is used in any facility process.
- Effluent limits for total residual chlorine are not quantifiable using EPA-approved analytical methods. The permittee will be in compliance with the effluent limits for chlorine provided the total residual chlorine levels are below the compliance evaluation level of 0.10 mg/L.

## 4.2 Basis for Effluent and Receiving Water Monitoring

In accordance with Alaska Statute (AS) 46.03.110(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed of. Monitoring in a permit is required to determine compliance with effluent limits. Monitoring may also be required to gather effluent and receiving water data to determine if additional effluent limits are required and/or to monitor effluent impact on the receiving water body quality.

The permit also requires the permittee to perform effluent monitoring required by the APDES Form 2A application, so that this data will be available when the permittee applies to reissue its APDES permit.

The permittee is responsible to conduct the monitoring and report results on DMRs or on the application for reissuance, as appropriate, to the Department. Additional discussion about the basis for monitoring requirements can be found in APPENDIX B through APPENDIX D.

#### **4.3 Monitoring Requirements**

The permit requires monitoring of the effluent for total discharge flow, BOD<sub>5</sub>, TSS, FC bacteria, pH, temperature, dissolved oxygen, ammonia, enterococci bacteria, and TRC as the aforementioned constituents have been determined to be pollutants of concern. The permit also requires monitoring of the influent for BOD<sub>5</sub> and TSS to calculate monthly removal rates for these parameters. Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Effluent monitoring frequencies in the permit are the same as were required in the 2011 permit. The permittee has the option of taking more frequent samples than required under the permit. These additional samples can be used for averaging if they are conducted using the Department – approved sufficiently sensitive test methods (generally found in 18 AAC 70 and 40 CFR Part 136 [adopted by reference in 18 AAC 83.010]), and if the Method Detection Limits are less than the effluent limitations. Table 2 presents the influent and effluent monitoring requirements.

The permittee shall perform the additional effluent testing in the APDES application Form 2A for publicly-owned treatment works (POTWs). The permittee shall submit the results of this additional testing with their application for renewal of this APDES permit. The permittee shall consult and review Form 2A upon permit issuance to ensure that the required monitoring in the application will be completed prior to submitting a request for permit renewal. A copy of Form 2A can be at: <http://dec.alaska.gov/water/wwdp/index.htm>.

#### **4.4 Receiving Water Body Limits and Monitoring Requirements**

The previous permit required monitoring for FC bacteria, enterococci bacteria, TRC, pH, temperature, and salinity at five sampling locations. Sampling was to occur each month from May through September and once during December through March. Once the permittee achieves compliance with the final FC bacteria effluent limits, the mixing zone authorization for this permit issuance will be revised and the total mixing zone size will decrease significantly. Based on the decreased mixing zone size in this permit issuance and in an effort to streamline and simplify sample collection, new mixing zone sample location and sample frequencies are required. Since the overall size of the mixing zones will decrease, and given the fact that modeling efforts are conducted under scenarios that factor in reasonable worst-case conditions, the effluent plume is expected to be diluted sufficiently, therefore it is not anticipated that the plume will contact the shoreline and shoreline sampling requirements have been removed from this permit issuance. In an effort to expand the dataset used to establish ammonia water quality criteria for future permit related mixing zone and WQBEL calculations, the Department has retained ambient sampling for pH, temperature, and salinity. At a minimum, monitoring locations must be established at an ambient location and locations representative of the length and width of the chronic mixing zone boundary as described in Fact Sheet Section 5.5. The permittee must seek written approval of the receiving water monitoring locations from the Department within one year of the effective date of the permit. The ambient monitoring location must be outside the influence of the facility's discharge (e.g., beyond the boundary and outside the mixing zone). Furthermore, sample frequency has been revised to twice per year to reflect the decrease in mixing zone size.

A section regarding an Annual Water Quality Monitoring Summary report has been included in this permit issuance. The report shall summarize analytical results and provide discussion and comparison of monitoring results for each station over time. This report is required to be submitted with other annual reporting requirements.

Table 3 lists ambient monitoring requirements for this permit issuance.

**Table 3: Receiving Water and Ambient Monitoring Requirements**

Parameter	Units	Ambient Sampling Frequency	Boundary of Mixing Zone Sampling Frequency	Sample Type
FC Bacteria	FC/100 mL	N/A	2/Year <sup>a</sup>	Grab
Total Ammonia as N	mg/L	N/A	2/Year <sup>a</sup>	Grab
Enterococci Bacteria	#/100 mL	N/A	2/Year <sup>a</sup>	Grab
TRC	mg/L	N/A	2/Year <sup>a</sup>	Grab
Temperature	°C	2/Year <sup>a</sup>	N/A	Measurement
pH	SU	2/Year <sup>a</sup>	2/Year <sup>a</sup>	Grab
Salinity	grams/kilogram	2/Year <sup>a</sup>	N/A	Grab
Footnotes:				
a. Two time per year means, one sample taken May through October and one sample taken November through April.				

## 5.0 RECEIVING WATER BODY

### 5.1 Description of Receiving Waterbody

According to Thorne et al, 2008, “Orca Inlet runs along the south side of Hawkins Inlet in the southeast corner of Prince William Sound (PWS). Water flows into the inlet from the Gulf of Alaska, via Strawberry Channel, northeast to Nelson Bay, where it mixes with PWS water that has coursed along the north side of Hawkins Island. Extensive mud flats fill the lower portion of the inlet, through which two channels course and join near Mud Bay on the west side of the inlet opposite Cordova (Thorne et al, 2008).” The area near the Cordova WWTP outfall is “generally quite shallow ( $\leq 15$  m(eters))” while the “physical oceanography...is characterized by low freshwater input and strong vertical mixing from tidal currents...brackish ( $S = 26 - 27$ ) with very weak stratification (Thorne et al, 2008).”

### 5.2 Outfall Location

Cordova WWTP discharges secondary treated domestic wastewater to Orca Inlet through outfall 001 located at latitude N 60° 32' 16" by longitude W 145° 46' 56". The outfall pipe is 14 inches in diameter and extends approximately 800 feet from shore. A six-port diffuser is located at the end of pipe that terminates at depth 15 feet below mean lower low water.

### 5.3 Water Quality Standards

Regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the WQS. The state's WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an Antidegradation Policy. The use classification system designates the uses that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the use classification of each water body. The Antidegradation Policy ensures that the existing uses and necessary water quality are maintained.

Water bodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some water bodies in Alaska can also have site-specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b). Orca Inlet, near the Cordova WWTP outfall, has not been reclassified pursuant to 18 AAC 70.230, nor does it have site-specific water quality criteria pursuant to 18 AAC 70.235. Therefore, Orca Inlet near the Cordova WWTP outfall, must be protected for all marine designated use classes listed in 18 AAC 70.020(a)(2). These marine designated uses consist of the following: water supply for

aquaculture, seafood processing and industry; contact and secondary recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

## 5.4 Water Quality Status of Receiving Water

Any part of a water body for which the water quality does not or is not expected to meet applicable WQS is defined as a “water quality limited segment” and placed on the state’s impaired water body list. For an impaired waterbody, Section 303(d) of the CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for a water body determined to be water quality limited. The TMDL documents the amount of a pollutant a water body can assimilate without violating a state’s WQS and allocates that load to known point sources and nonpoint sources.

Orca Inlet is not included on the *Alaska’s Final 2010 Integrated Water Quality Monitoring and Assessment Report*, July 15, 2010, as an impaired waterbody, nor is the waterbody listed as a CWA 303(d) waterbody requiring a TMDL. Orca Inlet is listed as a Category 3 Waterbody: “Waters for which there is insufficient or not data and information to determine whether any designated use is attained (DEC 2010).” As such, no TMDL has been prepared for Orca Inlet.

## 5.5 Mixing Zone Analysis

In accordance with state regulations at 18 AAC 70.240, as amended through June 23, 2003, the Department has authority to authorize a mixing zone in a permit.

The previous APDES permit for Cordova WWTP authorized a chronic mixing zone for FC bacteria, TRC, and total ammonia. The mixing zone authorization included a dilution factor of 446 and the size of the mixing zone was 920 meters long by 200 meters wide centered over the diffuser extending from the sea floor to the surface. The driving parameter for the size of the previous mixing zone was FC bacteria. The previous mixing zone will remain in effect for FC bacteria until the permittee achieves compliance with the final FC bacteria effluent limits listed in Table 2. The permittee provided new data on ambient salinity as well as ambient sample results for ammonia, enterococci, and FC bacteria along with a new mixing zone application. The permit is requiring a compliance schedule for the Cordova WWTP to achieve compliance with final effluent limits for FC bacteria (see Fact Sheet Section 8.5), as a result the size of the mixing zone will decrease and ammonia will be the parameter that drives the mixing zone size. Until final FC bacteria effluent limits are in compliance, the mixing zone authorization in the previous permit will remain in effect. Once compliance with final FC bacteria effluent limits is achieved, the mixing zone authorization will be as described in the subsequent paragraphs in this Fact Sheet Section. Permit Sections 1.5.1 through 1.5.5 describe the sizes of the different mixing zones. The rationale for this mixing zone is located in the final Fact Sheet for APDES Permit AK0021547 issued May 27, 2011.

The effluent from Cordova WWTP is treated to secondary standards and discharged to the marine waters of Orca Inlet. There have not been any changes to the outfall since the mixing zone was modeled for the 2011 permit. Effluent data submitted on DMRs from September 2010 to August 2016 were reviewed. Based on the DMR data, the Form 2M application received (mixing zone application), and the previous CORMIX modeling efforts, a mixing zone for ammonia, TRC, FC bacteria, and enterococci is authorized for this discharge. The final mixing zone is sized such that the water quality criteria found in 18 AAC 70 are met at the boundary of the mixing zone, to ensure that the mixing zone is as small as practicable and to comply with all applicable mixing zone regulations. A chronic mixing zone, sized as a rectangle with a width of 12 meters (perpendicular to the shoreline) and a length of 222 meters (parallel to the shoreline), centered on the diffuser, from the seafloor to the surface is authorized for ammonia, TRC, FC bacteria, and enterococci bacteria. The mixing zone size was driven by the dilution required for ammonia. Reasonable potential analyses indicates that ammonia will have a maximum expected effluent concentration of 27.9 mg/L. The dilution factor for the chronic mixing zone is 65. Furthermore,

a rectangular acute mixing zone sized as a width of 12 meters and a length of 26 meters centered on the diffuser, from the seafloor to the surface, is established per 18 AAC 70.255 for ammonia and TRC. The dilution factor for the acute mixing zone is 8.6.

APPENDIX E, Mixing Zone Analysis Checklist, outlines criteria that must be considered when the Department analyzes a permittee's request for a mixing zone. These criteria include the size of the mixing zone, treatment technology, existing uses of the water body, human consumption, spawning areas, human health, aquatic life, and endangered species. All criteria must be met in order to authorize a mixing zone. The following summarizes this analysis:

### **5.5.1 Size**

In accordance with 18 AAC 70.255, the Department determined that the size of the mixing zone for the Cordova WWTP wastewater discharge is appropriate.

The previous permit authorized a chronic mixing zone that corresponded to a surface area of 184,000 m<sup>2</sup> and a dilution factor of 446. DEC proposes to authorize one chronic mixing zone with a total surface area of 2,682 m<sup>2</sup> (222 meters long by 12 meters wide) and a dilution factor of 65. The dilution factor and size of the mixing zone have decreased significantly.

An acute mixing zone is sized to prevent lethality to passing organisms, while a chronic mixing zone is sized to protect the ecology of the water body as a whole (18 AAC 70). According to EPA (EPA 1991), lethality to passing organisms would not be expected if an organism passing through the effluent plume (along the path of maximum exposure) is not exposed to concentrations exceeding the acute criteria when averaged over a one-hour time period. Furthermore, the travel time of an organism drifting through the acute mixing zone must be less than approximately 15 minutes if a one hour exposure time is not to exceed the acute criterion (EPA 1991).

Acute mixing zone sizes were calculated using CORMIX. The acute mixing zone modeling resulted in an acute mixing zone size of 26 meters long by 12.2 meters wide. Mixing zone CORMIX modeling indicates that a drifting organism passing through the Cordova WWTP acute mixing zone will be exposed to acute concentrations for no longer than 12 seconds. Furthermore, the mixing zone is not expected to cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone.

A conceptual modeling program, CORMIX, was used in the determination of the size of the chronic and acute mixing zones authorized in the 2011 permit. Information used to determine a mixing zone size through CORMIX includes characteristics of the receiving water and the effluent discharge, as well as local geographical conditions and physical characteristics of the outfall. The same inputs as the previous permit issuance were used, as there have been no changes to the physical characteristics and discharge geometry of the outfall, the effluent flowrate, or the local geographical and ambient conditions. However, additional ambient salinity information and a newer CORMIX modeling software version (10.0E) were applied. The newer CORMIX modeling software required minor alterations to the model pertaining to the discharge pipe size and the contraction ratio used to model the diffuser port openings. The Department consulted with representatives from MixZon, the proprietors of the CORMIX software, to ensure that revisions to the outfall geometry inputs were handled appropriately (personal communication MixZon, 2016). Model inputs for effluent ammonia concentrations were updated to reflect data submitted during the previous five years. Additionally, ambient salinity data and temperature data taken from a nearby National Oceanic and Atmospheric Administration (NOAA) buoy supplemented the information from the previous modeling effort and provided information for the revised and updated CORMIX model for this permit issuance.

Chronic and acute mixing zone sizes were not evaluated for TRC because TRC requires less dilution to meet water quality-criteria per Department procedures. Maximum expected effluent concentrations for TRC and ammonia are summarized in Table C-1.

### **5.5.2 Technology**

In accordance with 18 AAC 70.240(a)(3), the Department finds that available evidence reasonably demonstrates that the effluent from Cordova WWTP will be treated to remove, reduce, and disperse pollutants using methods found by the Department to be the most effective and technological and economical feasible, consistent with the highest statutory and regulatory treatment requirements.

As a POTW, the Cordova WWTP is subject to at a minimum, the secondary treatment standards at 40 CFR § 133.102, as adopted by reference at 18 AAC 83.010(e). Cordova WWTP is an aerated activated sludge plant that consists of a grit chamber, aeration tanks, a clarifier, a sludge digester, and a chlorine contact chamber. The wastewater is disinfected prior to discharge. The facility rarely violates permit limits and routinely provides high quality effluent. Additionally, this permit includes a compliance schedule to meet final effluent limits for FC bacteria that are more stringent than the previous permit.

### **5.5.3 Existing Use**

In accordance with 18 AAC 70.245, the mixing zone has been appropriately sized to fully protect the existing uses of Orca Inlet. The existing uses have been maintained and protected under the terms of the previous permit. The permit reissuance application does not propose any changes that would likely result in a lower quality effluent. This permitting action proposes to reduce the size of the chronic mixing zones from the previous permit issuance. Effluent monitoring results for the past five years indicate that the discharge neither partially nor completely eliminates an existing use of the water body outside of the mixing zone boundary. The residence time of any floating organism traveling through the chronic mixing zone is expected to be relatively short, with a potential exposure to diluted effluent for up to 128 seconds (2.1 minutes) based on the CORMIX models. Exposure to acute concentrations of pollutants from the effluent in the mixing zone would be 12 seconds. Mixing zone modeling suggests that the flushing is adequate to ensure full protection of uses of the water body outside of the mixing zone. DEC has determined that the existing uses and biological integrity of the water body will be maintained and fully protected under the terms of the permit as required by 18 AAC 70.245(a)(1-2), 18 AAC 70.250(a)(3), and 18 AAC 70.250(a)(4).

### **5.5.4 Human Consumption**

Under the conditions of the permit, and in accordance with 18 AAC 70.250(b)(2) and (b)(3), the pollutants discharged cannot produce objectionable color, taste, or odor in aquatic resources harvested for human consumption; nor can the discharge preclude or limit established processing activities or commercial, sport, personal use, or subsistence fish and shellfish harvesting. There has been no indication that established fishing or shellfish harvesting has been precluded by the discharge, and signs are required to be posted to inform the public that certain activities such as harvesting of aquatic life for raw consumption and primary contact recreation should not take place in the mixing zone.

The CORMIX modeling suggests that the maximum expected effluent concentrations of pollutants will be diluted rapidly and that the mixing zone will not preclude or limit established fishery activities per 18 AAC 70.250(b)(3). DEC has determined that application data and available mixing zone modeling suggests that pollutants discharged will neither produce objectionable color, taste, or odor in harvested aquatic resources for human consumption, nor preclude or limit fish and shellfish harvesting per 18 AAC 70.250(b)(2-3).

### **5.5.5 Spawning Areas**

The mixing zone is authorized in the marine waters of Orca Inlet. 18 AAC 70.255(h), which prohibits authorizing mixing zones in streams, rivers or other flowing fresh waters used for anadromous or resident fish spawning, does not apply to this permitting action. Discharges to fresh waters are not authorized under the permit.

### **5.5.6 Human Health**

In accordance with 18 AAC 70.250 and 18 AAC 70.255, the mixing zone authorized in the permit shall be protective of human health and will not result in pollutants discharged at levels that will bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota, or at levels that otherwise will create a public health hazard through encroachment on a water supply or contact recreation uses. An analysis of the effluent testing data that was included with the Cordova WWTP wastewater discharge application and the results of the reasonable potential analysis conducted on pollutants of concern indicate that the level of treatment at Cordova WWTP is protective of human health. Sampling information submitted with the permit applications (and previous monitoring required by the permit) do not indicate that the discharge contains any pollutants known to bioaccumulate, bioconcentrate, or persist above background levels or could be expected to cause carcinogenic, mutagenic, or teratogenic effects, or otherwise present a risk to human health. The quality of the effluent is required to meet water quality criteria either at the end of the pipe or at the boundary of the mixing zone. There are no known water supply or contact recreation uses occurring in the vicinity of the discharge. DEC has determined that the permit satisfies 18 AAC 70.250(a)(1)(A-C), 18 AAC 70.255 (b and c), and that the level of treatment at Cordova WWTP is protective of human health.

### **5.5.7 Aquatic Life and Wildlife**

In accordance with 18 AAC 70.250 and 18 AAC 70.255, the mixing zone authorized in the permit shall be protective of aquatic life and wildlife. Pollutants for which the mixing zone will be authorized will not accumulate in concentrations outside of the mixing zone that are undesirable, present a nuisance to aquatic life, cause permanent or irreparable displacement of indigenous organisms, or result in a reduction in fish or shellfish population levels. There are freshwater spawning locations in rivers in the vicinity of the Cordova WWTP outfall and salmon pass through the area on the way to these locations. CORMIX models of the Cordova WWTP outfall indicate that high dilution occurs relatively rapidly and pollutants discharged will have a relatively short residence time in the mixing zones. Based on a review of effluent data, mixing zone modeling, and the long operational history of wastewater treatment at the Cordova WWTP, the Department determined that the mixing zones will not create a significant adverse effect to fish spawning or rearing, form a barrier to migratory species, fail to provide a zone of passage, result in undesirable or nuisance aquatic life, result in permanent or irreparable displacement of indigenous organisms, or result in reduction in fish population levels. The Department finds that the discharge will meet all water quality criteria at the boundary of the mixing zone and that 18 AAC 70.250 and 18 AAC 70.255 are met.

### **5.5.8 Endangered Species**

In accordance with 18 AAC 70.250(a)(2)(D), the authorized mixing zone will not cause an adverse effect on threatened or endangered species. The National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS), were contacted in 2016, however only NMFS responded. A summary of critical habitat and endangered species is provide in Fact Sheet section 9.2. Due to the relatively short residence time of pollutants in the mixing zone, the Department has determined that issuance of the permit is unlikely to affect any of the threatened or endanger species in the vicinity of the discharge. DEC will provide a copy of the permit and fact sheet to NMFS and USFWS when it is public noticed. Any comments received from the agencies regarding endangered species will be considered prior to issuance of the permit.

## **6.0 ANTIBACKSLIDING**

18 AAC 83.480 requires that “effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit.” 18 AAC 83.480(c) also states that a permit may not be reissued “to contain an effluent limitation that is less stringent than required by effluent

guidelines in effect at the time the permit is renewed or reissued.” The effluent limitations in this permit reissuance are consistent with 18 AAC 83.430. The permit effluent limitations, standards, and conditions are as stringent as in the 2011 permit.

The final effluent limit for FC bacteria is more stringent than the previous permit which requires a compliance schedule (see fact sheet section 8.5). The authorized mixing zone dilution and size for this permit issuance is smaller than that of the previous permit. This mixing zone authorization used new sampling and modeling information that was not available during the previous permit issuance, therefore the Department has revised the ambient monitoring requirements to reflect the significant decrease in size of the mixing zone and has clarified sampling requirements related to the collection of receiving water samples.

## 7.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's Antidegradation Policy. The Antidegradation Policy of the WQS (18 AAC 70.015) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected. This section analyzes and provides rationale for the Department's decisions in the permit issuance with respect to Antidegradation Policy.

The Department's approach to implementing the Antidegradation Policy, found in 18 AAC 70.015, is based on the requirements in 18 AAC 70 and the Department's *Policy and Procedure Guidance for Interim Antidegradation Implementation Methods*, dated July 14, 2010. Using these procedures and policy, the Department determines whether a waterbody, or portion of a waterbody, is classified as Tier 1, Tier 2, or Tier 3, where a higher numbered tier indicates a greater level of water quality protection. At this time, no Tier 3 waters have been designated in Alaska. Orca Inlet is not listed as impaired on DEC's most recent *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*; therefore, a Tier 1 designation is not warranted. Accordingly, this antidegradation analysis conservatively assumes that the discharge is to a Tier 2 waterbody.

The State's Antidegradation Policy in 18 AAC 70.015(a)(2) states that if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (i.e. Tier 2 waters), that quality must be maintained and protected. The Department may allow a reduction of water quality only after finding that five specific requirements of the Antidegradation Policy at 18 AAC 70.015(a)(2)(A – E) are met. The Department's findings follow:

1. **18 AAC 70.015 (a)(2)(A).** *Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.*

Based on the evaluation required under 18 AAC 70.015(a)(2)(D) below, the Department has determined that the most reasonable and effective polluting prevention, control, and treatment methods are being used and that the localized lowering of water quality is necessary.

The Cordova WWTP provides collection and treatment of domestic wastewater for individual households and supporting businesses for a community with a population of 2,386<sup>1</sup>.

The Department concludes that the operation of the Cordova WWTP and the authorization of the discharge accommodates the important economic and social development of the City of Cordova and that the finding is met.

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<sup>1</sup> “DCCED Community Database Online,”

<https://www.commerce.alaska.gov/dcra/DCRAExternal/community/Details/19933dbf-2637-4b88-ba6a-9021796c9354> , accessed February 21, 2017.



2. **18 AAC 70.015 (a)(2)(B).** *Except as allowed under this subsection, reducing water quality will not violate the applicable criteria of 18 AAC 70.020 or 18 AAC 70.235 or the whole effluent toxicity limit in 18 AAC 70.030.*

The permit reissuance application does not propose any change that would result in wastewater of lower quality being discharged from the Cordova WWTP than has been historically discharged under the previously issued APDES and NPDES individual permits. Modeling results and the results of monitoring data submitted during the 2011 permit cycle indicate the discharge authorized by the permit conform to the requirements of 18 AAC 70.020.

The Department has not established or adopted site-specific criteria for Orca Inlet in the vicinity of the discharge. Therefore, criteria allowed by 18 AAC 70.235 have not been violated by issuance of the permit.

Cordova WWTP treats domestic wastewater and there are no known non-domestic industrial users. Due to the nature (i.e., domestic only) of the wastewater, violations of the WET water quality criteria, found at 18 AAC 70.030, are not likely. Therefore, a mixing zone for WET is not authorized for this permit issuance.

The Department has determined that the reduction in water quality will not violate applicable criteria found in 18 AAC 70.020, 18 AAC 70.235, or 18 AAC 70.030, and that the finding is met.

3. **18 AAC 70.015(a)(2)(C).** *The resulting water quality will be adequate to fully protect existing uses of the water.*

The WQS, upon which the permit effluent limits are based, serve the specific purpose of protecting the existing and designated uses of the receiving waterbody. Orca Inlet is protected for all designated uses (see Fact Sheet section 5.3); therefore, the most stringent water quality criteria found in 18 AAC 70.020 and in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (DEC 2008) were selected for use in the RPA for Cordova WWTP wastewater discharge effluent. This will ensure that the resulting water quality at and beyond the boundary of the authorized mixing zone will fully protect all designated uses of the receiving waterbody.

The Department has determined that Cordova WWTP wastewater treatment will result in adequate water quality to fully protect existing uses of the waterbody and that the finding is met.

4. **18 AAC 70.015(a)(2)(D).** *The methods of pollution prevention, control, and treatment found by the department to be most effective and reasonable will be applied to all wastes and other substances to be discharged.*

The methods of prevention, control, and treatment the Department finds to be most effective and reasonable are currently in use at the facility and include meeting federal (40 CFR 133) and state (18 AAC 72.050) secondary treatment requirements. The Cordova WWTP produces secondary treated domestic wastewater via an aerated activated sludge package plant that consists of a grit chamber, aeration tanks, clarifier, sludge digester, and a chlorine contact basin. Federal secondary treatment standards at 40 CFR 133.102, adopted by reference at 18 AAC 83.010(e) describe minimum levels of effluent quality in terms of BOD<sub>5</sub>, TSS, and pH that are achievable by secondary treatment facilities. Accordingly, DEC has applied the BOD<sub>5</sub> and TSS minimum achievable effluent quality levels as TBELs in this permit. The previous permit contained water quality criteria for pH that are more stringent than the pH TBELs. The Cordova WWTP has consistently demonstrated compliance with the more stringent water quality pH criteria; therefore, the previous pH permit limits are retained in the permit.

The permit requires that the Cordova WWTP have both an updated QAPP and an O&M Plan to ensure protocol for discharging adequately treated wastewater is followed to the extent feasible. The permittee is required to annually review the O&M Plan and associated Best Management Practices that include pollution prevention measures and controls appropriate for the facility. A schedule of compliance is

included in the permit to achieve compliance with lower FC bacteria limits than were authorized in the previous permit issuance.

The Department has determined that the methods of pollution prevention, control, and treatment found to be most effective and reasonable will be applied to all wastes and substances discharged from Cordova WWTP and that the finding is met.

5. **18 AAC 70.015(a)(2)(E).** *All wastes and other substances discharged will be treated and controlled to achieve (i) for new and existing point sources, the highest statutory and regulatory requirements; and (ii) for nonpoint sources, all cost-effective and reasonable best management practices.*

The applicable “highest statutory and regulatory treatment requirements” are defined in 18 AAC 70.990(30) (as amended June 26, 2003) and in the Department’s *Policy and Procedure Guidance for Interim Antidegradation Implementation Methods*. Accordingly, there are three parts to the definition, which are:

- (A) any federal technology-based effluent limitation guidelines (ELG) identified in 40 CFR § 125.3 and 40 CFR § 122.29, as amended through August 15, 1997, both adopted by reference at 18 AAC 83.010;
- (B) minimum treatment standards in 18 AAC 72.040; and
- (C) any treatment requirement imposed under another state law that is more stringent than a requirement of this chapter.

The first part of the definition includes all federal technology-based ELGs including “For POTWs, effluent limitation based upon...Secondary Treatment” at 40 CFR § 125.3(a)(1) defined at 40 CFR § 133.102, adopted by reference at 18 AAC 83.010(e), which are incorporated in the permit.

The second part of the definition 18 AAC 70.990(B) (2003) appears to be in error, as 18 AAC 72.040 describes discharges to sewers and not minimum treatment. The correct reference appears to be the minimum treatment standards found at 18 AAC 72.050, which refers to domestic wastewater discharges only. The authorized domestic wastewater discharge is in compliance with minimum treatment standards found in 18 AAC 72.050, as reflected by the permit limits specifying secondary treatment standards.

The third part includes any more stringent treatment required by state law, including 18 AAC 70 and 18 AAC 72. Neither the regulations in 18 AAC 70 and 18 AAC 72, nor another state law that the Department is aware of impose more stringent requirements than those found in 18 AAC 70.

After review of the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that Cordova WWTP’s wastewater discharge meets the highest applicable statutory and regulatory requirements and that the finding is met.

## 8.0 OTHER PERMIT CONDITIONS

### 8.1 Quality Assurance Project Plan

The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to update the QAPP within 120 days of the effective date of the final permit. Additionally, the permittee must submit a letter to the Department within 120 days of the effective date of the permit stating that the plan has been updated and implemented within the required time frame. The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; precision and accuracy requirements; data reporting; and quality assurance/quality control

criteria. The permittee is required to amend the QAPP whenever any procedure addressed by the QAPP is modified. The plan shall be retained on site and made available to the Department upon request.

## **8.2 Industrial User Survey**

The permittee is required to submit with their permit reissuance application, Form 2A, an industrial user survey report. The goal of the Industrial User Survey is to identify industries that discharge non-domestic wastewater into the Cordova WWTP collection (and ultimately the treatment system) that have the potential to adversely impact the treatment capabilities of the WWTP and the quality of the treated wastewater. The results will be used to determine if the Cordova WWTP may need to develop a pretreatment program or include pretreatment requirements in their wastewater discharge permit. The pretreatment program is authorized under 40 CFR Part 403, adopted by reference in 18 AAC 83.010(g)(2).

## **8.3 Operation and Maintenance Plan**

The permit requires the permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limitations, monitoring requirements, and all other permit requirements at all times. The permittee is required to submit written notice to DEC within 180 days of the effective date of the permit stating that an O&M Plan for its facility has been developed or updated and implemented. If an O&M Plan has already been developed and implemented, the permittee need only to review the existing plan to make sure it is up to date and all necessary revisions are made. The plan shall be reviewed annually, retained on site, and made available to the Department upon request. Permit Section 2.2.1 requires that best management practices be included in an O&M plan with the purpose of preventing or minimizing the release of pollutants to Orca Inlet.

## **8.4 Facility Plan and Bypass Events**

If Cordova WWTP's average annual flow exceeds 85% of 0.7 mgd design flowrate, the permittee will be required to develop a Facility Plan that evaluates the WWTP's existing condition and identifies near and long-term needs and potential improvements. The Facility Plan must include a schedule to come into compliance with the design criteria. The Facility Plan must include the permittee's strategy for continuing to maintain compliance with effluent limits and be made available to the Department upon request.

Cordova WWTP experienced a number of bypass events during the previous permit cycle that were attributed to high inflow and infiltration events. Table 4 lists the dates, hours bypassed, and an estimate of wastewater bypassed around the treatment facility. 18 AAC 83.415 prohibits bypass of wastewater treatment facilities. The Department is requiring the applicant to provide an annual report that includes the duration of each bypass, the estimated volume, and steps the permittee is taking to eliminate the wastewater bypass.

**Table 4 Cordova WWTP Bypass History**

<b>Dates</b>	<b>Total Days/Hours Bypass Occurred</b>	<b>Wastewater Bypassed (Million Gallons)</b>
2/1/2011	24 hours	0.400
9/15/2012-10/1/2012	13 days, 16.5hours	5.600
9/6/2013-9/11/2013	5 days	2.000
9/18/2013	23 hours	0.200
9/13/2014-9/15/2014	2 days, 3 hours	0.850
9/16/2014	8 hours	0.064
9/29/2015	23 hours	0.640
11/25/2015-11/28/2015	3 days, 2 hours	1.850
8/7/2016-8/8/2016	1day, 5 hours	0.846
8/12/2016-8/13/2016	1 day	0.700

## 8.5 Compliance Schedule

In accordance with 18 AAC 70.910 and 18 AAC 83.560, APDES permits may include a series of required steps and deadlines (i.e., a compliance schedule), which upon completion, enables the permittee to meet the permit's WQBEL(s). A compliance schedule establishes remedial measures in a permit, including an enforceable sequence of interim requirements such as actions, operations, or milestone events leading to compliance. Compliance schedules authorized under 18 AAC 83.560 require that if a permit establishes a schedule of compliance that exceeds one year, the schedule must set out interim requirements and dates for their achievement. If the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress towards completion of the interim requirements.

The effluent limits for FC bacteria established in the previous permit issuance for Cordova required a mixing zone size that greatly exceeds the size necessary for ammonia. In an effort to make WQBELs for FC bacteria in the Cordova WWTF permit consistent with other APDES permits for POTWs that disinfect via chlorination and to greatly decrease the size of the authorized mixing zone, the Department is revising WQBELs for FC bacteria in this permit issuance. The FC limits for this permit issuance have been revised to 200 FC/100 mL for a monthly average, 400 FC/100 mL for a weekly average, and 800 FC/100 mL for a daily maximum. 200 and 400 FC/100 mL match the regulatory definition of "disinfect" at 18 AAC 72.990 (21). The level 800 FC/100 mL was chosen to be consistent other recently issued APDES permits (Homer WWTP, Juneau-Douglas WWTP, and Mendenhall WWTP—AK0021245, AK0023213, and AK0022951, respectively). An evaluation of FC bacteria discharge monitoring data indicates that the facility would not be able to immediately comply with final effluent limits for FC bacteria in Table 2 upon the effective date of the permit; therefore, the permit contains a five-year compliance schedule for FC bacteria per 18 AAC 83.560.

The compliance schedule contains interim and final limits for FC bacteria. The final effluent limits for FC bacteria are consistent with other APDES permits for POTWs that include disinfection and require dilution factors that are less than those required for ammonia. CORMIX modeling indicates that dilution factors required by the final effluent limits for FC bacteria (18.6 dilution factor for daily max limit of 800 FC/100mL) will be achieved within the chronic mixing zone for ammonia which requires a dilution factor of 65. Therefore water quality criteria will be met at the boundary of the authorized chronic

mixing zone once the facility comes into compliance with the final effluent limits as required by CWA §301(b)(1)(C) and §502(17).

The final WQBELs for FC bacteria in this permit issuance are new WQBELs, therefore the compliance schedule established in the permit accounts for possible modifications to the facility and includes interim annual reporting requirements consistent with 18 AAC 83.560(b). These interim requirements include providing the Department annual reports that include descriptions of potential upgrades to the WWTP, identifies potential sources of funding, and outlines proposed construction schedules. A five-year compliance schedule provides a reasonable and appropriate timeframe to achieve compliance with the final FC bacteria effluent limits; however, Permit Section 1.3.1 requires that the permittee achieve compliance “as soon as possible.” The five-year compliance schedule is consistent with other APDES permits for POTWs requiring disinfection. If necessary, the schedule accounts for the time required to pursue funding for any potential upgrades, submission of engineering plans to the Department for review, design and construction, and becoming fully operational and achieving compliance with the final FC bacteria effluent limits. A shorter schedule would make achieving compliance with final FC bacteria effluent limits potentially infeasible in the event that significant upgrades to the POTW are needed. The Alaska’s Clean Water Actions Grant deadline for funding applications for the State Fiscal Year 2018 was February 15, 2017. As such, applications for funding under that grant would need to wait until the State Fiscal Year 2019 grant cycle, which would delay implementation of upgrades to the POTW if funding under this program is pursued. Permit Section 1.3.1 further describes how the permittee will achieve compliance with the final FC bacteria effluent limits prior to the five year period concluding. The Department defined “achieve compliance” to mean not exceeding the monthly average FC bacteria effluent limit for three consecutive months, not exceeding the weekly average FC bacteria effluent limit for four consecutive weeks, and not exceeding the daily maximum FC bacteria effluent limit for four consecutive samples. If the aforementioned definition of achieving compliance is not met post five years of the effective date of the permit, the final FC bacteria effluent limits still go into place at the conclusion of the five year period. The Department determined that the effluent limits in the previous permit issuance are reasonable interim FC bacteria effluent limits. While the FC bacteria schedule of compliance is in effect, the following interim FC bacteria effluent limits are in place.

**Table 5. Interim FC bacteria effluent limits**

Parameter	Units	Effluent Limits			Monitoring Frequency		
		Monthly Average	Weekly Average	Daily Maximum	Sample Location	Sample Frequency	Sample Type
FC	FC/100 mL	4,500 <sup>a</sup>	6,750 <sup>a</sup>	10,000 <sup>b</sup>	Effluent	Weekly	Grab
Footnotes:							
a. If more than one fecal coliform bacteria sample or enterococci bacteria sample is collected within a 30-day (monthly) or 7-day (weekly) period, the average result must be reported as the geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of “n” quantities is the “nth” root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is $(100 \times 200 \times 300)^{1/3} = 181.7$ . See Appendix C for calculation.							
b. Reporting is required within 24 hours if the daily maximum limit is violated. See Appendix A, Section 3.4.3.3.							

## 8.6 Electronic Reporting (E-Reporting) Rule

The permittee is responsible for electronically submitting DMRs and other reports in accordance with 40 CFR §127. The start dates for e-reporting are provided in 40 CFR §127.16. DEC has established a website at <http://dec.alaska.gov/water/Compliance/EReportingRule.htm> that contains general information. As DEC implements the E-Reporting Rule, more information will be posted on this webpage. The permittee will be further notified by DEC in the future about how to implement the conditions in 40 CFR §127.

## 8.7 Standard Conditions

Appendix A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on the regulations and cannot be challenged in the context of an individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

## 9.0 OTHER LEGAL REQUIREMENTS

### 9.1 Ocean Discharge Criteria Evaluation

Section 403(a) of the CWA, Ocean Discharge Criteria, prohibits the issuance of a permit under Section 402 of the CWA for a discharge into the territorial sea, the water of the contiguous zone, or the oceans except in compliance with Section 403. Permits for discharges seaward of the baseline of the territorial seas must comply with the requirements of Section 403, which include development of an Ocean Discharge Criteria Evaluation (ODCE).

An interactive map depicting Alaska's baseline plus additional boundary lines is available at:

[http://www.arcgis.com/home/webmap/viewer.html?url=http%3A%2F%2Fmapping.fakr.noaa.gov%2Farcgis%2Frest%2Fservices%2FNOAA\\_Baseline%2FMapServer&source=sd](http://www.arcgis.com/home/webmap/viewer.html?url=http%3A%2F%2Fmapping.fakr.noaa.gov%2Farcgis%2Frest%2Fservices%2FNOAA_Baseline%2FMapServer&source=sd)

The map is provided for information purposes only. The U.S. Baseline committee makes the official determinations on baseline.

A review of the baseline line maps revealed that the Cordova outfall terminus is positioned landward of the baseline of the territorial sea; therefore, Section 403 of the CWA does not apply to the permit, and an ODCE analysis is not required to be completed for this permit reissuance. Further, the permit requires compliance with WQS such that 40 CFR 125.122(b) is met and therefore the discharge is presumed not to cause unreasonable degradation of the marine environment.

### 9.2 Endangered Species Act

NMFS is responsible for administration of the Endangered Species Act (ESA) for listed cetaceans, seals, sea lions, sea turtles, anadromous fish, marine fish, marine plants, and corals. All other species (including polar bears, walrus, and sea otters) are administered by the USFWS.

The ESA requires federal agencies to consult with the NOAA, NMFS, and the USFWS if their actions could beneficially or adversely affect any threatened or endangered species. As a state agency, DEC is not required to consult with federal agencies regarding permitting actions. However, DEC voluntarily requested information from NOAA and USFWS on December 8, 2016 regarding threatened and/or endangered species or critical habitat under their jurisdiction that is applicable to the area of the City of Cordova WWTP discharge.

The Department accessed the USFWS website "https://ecos.fws.gov/ipac/location/index" on December 20, 2016. The website identified no endangered species expected to occur at the location. The website identified critical habitat for Steller sea lion (*Eumetopias jubatus*) in the location of the Cordova WWTP outfall.

This fact sheet and the permit will be submitted to the agencies for review during the public notice period and any comments received from these agencies will be considered prior to issuance of the permit.

### 9.3 Essential Fish Habitat

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires federal agencies to consult with NOAA when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH.

As a state agency, DEC is not required to consult with federal agencies regarding permitting actions, however, DEC voluntarily requested EFH information for the vicinity of the facility on December 8, 2016. NMFS responded on December 9, 2016 confirming that no EFH or habitat areas of concern are in the project area (personal communication, Matthew Eagleton, 2016). The Department additionally accessed EFH information via use of NOAA's Habitat Conservation Interactive EFH Mapper located at: <http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html>. The Data Query Tool was used for the City of Cordova WWTP near the outfall location. This tool indicated that no Habitat Areas of Particular Concern nor EFH areas protected from fishing were identified at the location.

DEC will provide NMFS with copies of the permit and fact sheet during the public notice period. Any comments received from NMFS regarding EFH will be considered prior to issuance of the permit.

### 9.4 Sludge (Biosolids) Requirements

Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. State and federal requirements regulate the management and disposal of sewage sludge (biosolids). The permittee must consult both state and federal regulations to ensure proper management of the biosolids and compliance with applicable requirements.

#### 9.4.1 State Requirements

The Department separates wastewater and biosolids permitting. The permittee should contact the Department's Solid Waste Program for information regarding state regulations for biosolids. The permittee can access the Department's [Solid Waste Program web page](#) for more information and who to contact.

#### 9.4.2 Federal Requirements

EPA is the permitting authority for the federal sewage sludge regulations at 40 CFR Part 503. Biosolids management and disposal activities are subject to the federal requirements in Part 503. The Part 503 regulations are self-implementing, which means that a permittee must comply with the regulations even if no federal biosolids permit has been issued for the facility.

A POTW is required to apply for an EPA biosolids permit. The permittee should ensure that a biosolids permit application has been submitted to EPA. In addition, the permittee is required to submit a biosolids permit application to EPA for the use or disposal of sewage sludge at least 180 days before this APDES permit expires in accordance with 40 CFR §§122.21(c)(2) and 122.21(q) [see also 18 AAC 83.110(c) and 18 AAC 83.310, respectively]. The application form is NPDES Form 2S and can be found on EPA's website, [www.epa.gov](http://www.epa.gov), under NPDES forms. A completed NPDES Form 2S should be submitted to:

U.S. Environmental Protection Agency  
Region 10, NPDES Permits Unit OWW-130  
Attention: Biosolids Contact  
1200 Sixth Avenue, Suite 900  
Seattle, WA 98101-3140

EPA Region 10 telephone number is 1-800-424-4372. Information about EPA's biosolids program and CWA Part 503 is available at [www.epa.gov](http://www.epa.gov) and either search for 'biosolids' or go to the EPA Region 10 website link and search for 'NPDES Permits'.

## **9.5 Permit Expiration**

The permit will expire five years from the effective date of the permit.

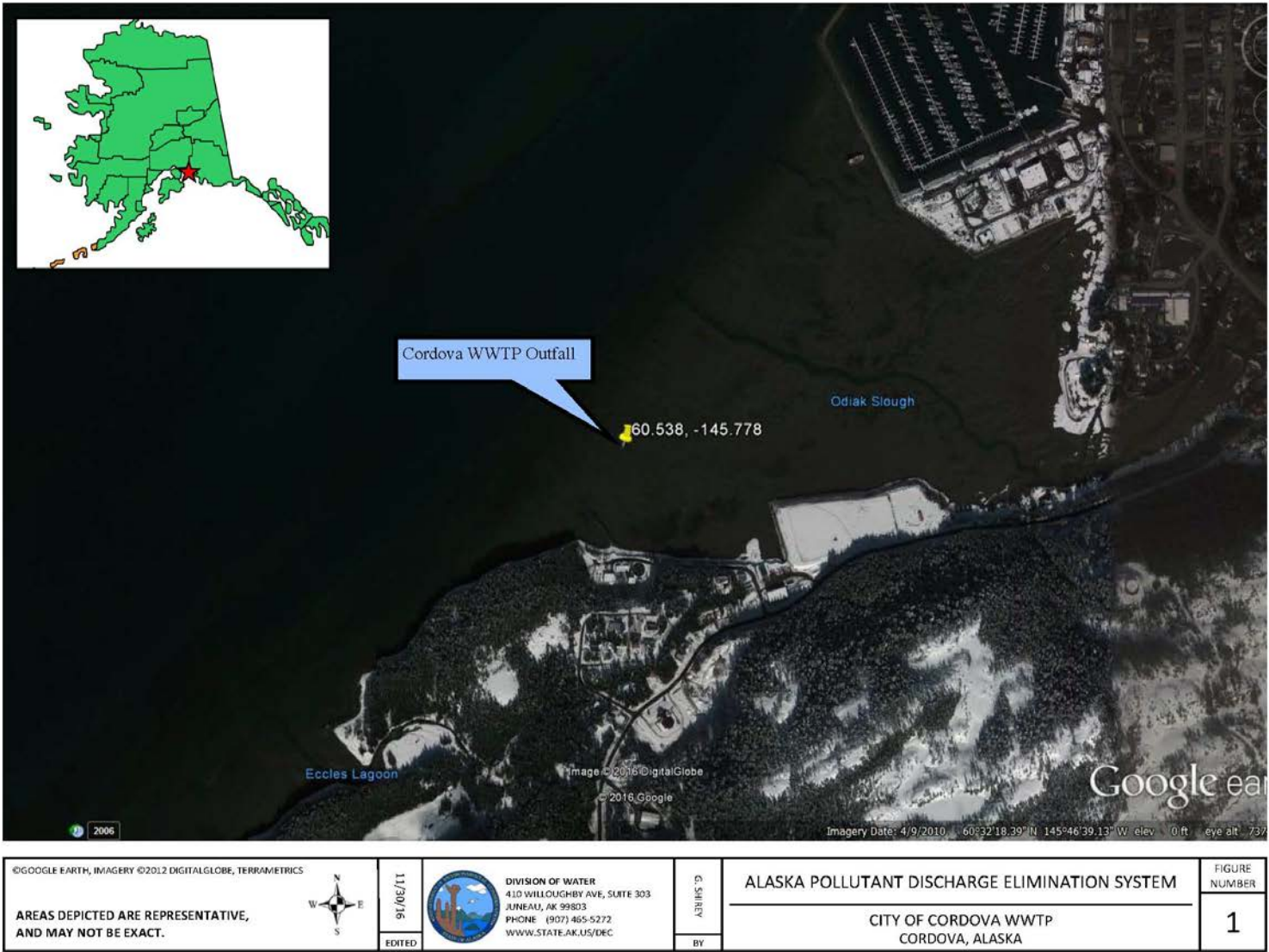


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APPENDIX A. Facility Information

Figure 1: Cordova WWTP Map



[illegible]

## APPENDIX B. Basis for Effluent Limitations

The Clean Water Act (CWA) requires a Publicly Owned Treatment Works (POTWs) to meet effluent limits based on available wastewater treatment technology, specifically, secondary treatment limits standards found at Title 40 Code of Federal Regulations (40 CFR) 133, adopted by reference in Alaska Administrative Code (AAC) 18 AAC 83.010(e). The Department may find, by analyzing the effect of an effluent discharge on the receiving water body, that secondary treatment effluent limits are not sufficiently stringent to meet water quality standards (WQS). In such cases, the Alaska Department of Environmental Conservation (DEC or the Department) is required to develop more stringent water quality-based effluent limits (WQBEL), which are designed to ensure that the WQS of the receiving water body are met.

Secondary treatment effluent limits for POTWs do not limit every parameter that may be present in the effluent. Secondary treatment effluent limits have only been developed for five-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), and pH. Effluent from a POTW may contain other pollutants, such as bacteria, chlorine, ammonia, or metals, depending on the type of treatment system used and the quality of the influent to the POTW (e.g., industrial facilities, as well as residential areas discharge into the POTW). When technology-based effluent limits (TBEL) do not exist for a particular pollutant expected to be in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a WQS criteria for the water body. If a pollutant causes or contributes to an exceedance of a WQS, a WQBEL for the pollutant must be established in the permit.

### B.1 Technology-Based Effluent Limitations

#### B.1.1 Secondary Treatment Effluent Limitations

The CWA requires a POTW to meet requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as “secondary treatment,” that all POTWs were required to meet by July 1, 1977. The Department has adopted the “secondary treatment” TBELs, which are found in 40 CFR §133.102, adopted by reference at 18 AAC 83.010(e). The TBELs apply to all POTWs and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD<sub>5</sub>, TSS, and pH. In addition to the federal secondary treatment regulations in 40 CFR Part 133, the State of Alaska requires maximum daily limitations of 60 mg/L for BOD<sub>5</sub> and TSS in its own secondary treatment regulations (18 AAC 72.990(59)). The secondary treatment effluent limits are listed in Table B-1.

**Table B-1: Secondary Treatment Effluent Limits**

Parameter	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Range
BOD <sub>5</sub>	30 mg/L	45 mg/L	60 mg/L	---
TSS	30 mg/L	45 mg/L	60 mg/L	---
Removal Rates for BOD <sub>5</sub> and TSS	85% (minimum)	---	---	---
pH	---	---	---	6.0 – 9.0 s.u.

### **B.1.2 Mass-Based Limitations**

The regulation at 18 AAC 83.540 requires that effluent limits be expressed in terms of mass, if possible. The regulation at 18 AAC 83.520 requires that effluent limits for a POTW be calculated based on the design flow of the facility in million gallons per day (mgd). The mass based limits are expressed in pounds per day (lbs/day) and pollutant concentration is expressed in milligrams per liter (mg/L) and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.342<sup>1</sup>

The BOD5 and TSS mass limits in the permit are:

Average Monthly Limit = 30 mg/L x 0.7 mgd x 8.34 = 175 lbs/day

Average Weekly Limit = 45 mg/L x 0.7 mgd x 8.34 = 263 lbs/day

Maximum Daily Limit = 60 mg/L x 0.7 mgd x 8.34 = 350 lbs/day

## **B.2 Water Quality – Based Effluent Limitations**

### **B.2.1 Statutory and Regulatory Basis**

18 AAC 70.010 prohibits conduct that causes or contributes to a violation of the WQS.

18 AAC 15.090 requires that permits include terms and conditions to ensure criteria are met, including operating, monitoring, and reporting requirements.

The regulations require the permitting authority to make this evaluation using procedures that account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water body. The limits must be stringent enough to ensure that WQS are met and must be consistent with any available wasteload allocation (WLA).

The CWA requires that the effluent limit for a particular pollutant be the more stringent of either TBELs or WQBELs. TBELs are established by the Environmental Protection Agency (EPA) for many industries in the form of Effluent Limitation Guidelines (ELG), are based on available pollution control technology and are adopted by reference in 18 AAC 83. The Department adopts the subject ELGs by reference in 18 AAC 83.010.

### **B.2.2 Reasonable Potential Analysis**

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving water body concentration for each pollutant of concern downstream of where the effluent enters the receiving water body. The chemical-specific concentration of the effluent and receiving water body and, if appropriate, the dilution available from the receiving water body, are factors used to project the receiving water body concentration. If the projected concentration of the receiving water body exceeds the numeric criterion for a limited parameter, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality criteria, and a WQBEL must be developed.

The Department may authorize a small volume of receiving water to provide dilution of the effluent; this volume is called a mixing zone. According to 18 AAC 70.990(38), a mixing zone is an area in a water body surrounding, or downstream of, a discharge where the effluent plume is

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<sup>2</sup> 8.341 is a conversion factor with units (lb x L) / (mg x gallon x 10<sup>6</sup>)



diluted by the receiving water within which specified water quality criteria may be exceeded. Water quality criteria and limits may be exceeded within a mixing zone. A mixing zone can be authorized only when adequate receiving water body flow exists, and the concentration of the pollutant of concern in the receiving water body is below the numeric criterion necessary to protect the designated uses of the water body.

The Department reviewed Cordova WWTP effluent data collected September 2010 through August 2016 and determined that the pollutants of concern are fecal coliform bacteria, ammonia, and total residual chlorine (TRC). Other pollutants, for which monitoring data was submitted as part of the application, were not considered to be of concern because data showed that effluent concentrations were consistently below applicable water quality criteria. The Department evaluated ammonia and TRC for reasonable potential using the *APDES Permits Reasonable Potential Analysis and Effluent Limits Development Guide* (APDES Guide, DEC 2014).

### **B.2.3 Procedure for Deriving Water Quality-Based Effluent Limits**

The APDES Guide and the WQS recommend the flow conditions for use in calculating WQBEL using steady-state modeling. The APDES Guide and the Alaska WQS state the WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria.

The first step in developing a WQBEL is to develop a WLA for the pollutant. A WLA is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of WQS or a total maximum daily load in the receiving water body.

In cases where a mixing zone is not authorized, either because the receiving water body already exceeds the criterion, the receiving water body flow is too low to provide dilution, or for some other reason one is not authorized, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee will not cause or contribute to an exceedance of the criterion.

The WQS at 18 AAC 70.020(a) designates classes of water for beneficial uses of water supply, water recreation, and of growth and propagation of fish, shellfish, other aquatic life, and wildlife.

### **B.2.4 Specific Water Quality-Based Effluent Limits**

#### **B.2.4.1 Toxic Substances**

The WQS for toxic and other deleterious organic and inorganic substances for marine uses are codified in 18 AAC 70.020(b)(23). Individual criteria are summarized in the Department's, *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances*, as amended through December 12, 2008. In the WQS, the most stringent criteria for is the chronic criteria for the protection of aquatic life.

As discussed in Section B.2.2 of the fact sheet, the Department evaluated ammonia and TRC to determine if there was reasonable potential for the pollutants to exceed water quality criteria in the receiving water body. Table B-2 presents the water quality criteria for ammonia and TRC. A summary of the reasonable potential analysis is provided in APPENDIX C.

**Table B-2: Water Quality Criteria**

<b>Parameter</b>		<b>Criterion (µg/L)</b>
Ammonia <sup>a</sup>	Acute	3,300
	Chronic	500
TRC	Acute	13
	Chronic	7.5
a. DEC used an ambient temperature of 10° C, pH of 8.6 S.U., and a salinity of 30 g/kg (after rounding) to establish the water quality criteria.		

#### **B.2.4.2      *Floating, Suspended or Submerged Matter, including Oil and Grease***

The WQS criteria for floating solids, debris, sludge, deposits, foam, scum, or other residues suspended or submerged are narrative. The most stringent standard, found at 18 AAC 70.020(b)(20)(D), amended as of June 26, 2003, require that marine waters, “may not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.” Permit Section 1.2.4 contains language prohibiting the discharge of floating solids, visible foam, or oily wastes that produce a sheen on the surface of the receiving water.

#### **B.2.4.3      *pH***

The criteria found at 18 AAC 70.020(b)(18)(A)(i), amended as of February 19, 2016, for water supply for aquaculture and the growth and propagation of fish, shellfish, other aquatic life, and wildlife are the most stringent standards for pH. These standards state that marine waters, “May not be less than 6.5 or greater than 8.5, and may not vary more than 0.2 pH unit outside of the naturally occurring range. As noted above in Section B.1.1, pH also has TBELs. Secondary treatment requires pH to be between the ranges of 6.0 to 9.0 standard pH units (SU). The WQBEL effluent limits for pH, a range between 6.5 s.u. and 8.5 s.u., have been retained from the previous permit issuance.

#### **B.2.4.4      *Dissolved Oxygen***

The criteria for agricultural water supply; contact and secondary water recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life are the most stringent standards for dissolved oxygen. The standards at 18 AAC 70.020(b)(15)(A)(i), amended as of February 19, 2016, require that surface dissolved oxygen concentrations in marine water may not be less than 6.0 mg/L nor greater than 17 mg/L; the concentration of total dissolved gas may not exceed 110% of saturation at any point of sample collection. The effluent limits for DO (daily minimum of 6.0 mg/L and daily maximum of 17 mg/L) have been retained from the previous permit issuance.

#### **B.2.4.5      *Fecal Coliform Bacteria***

The criteria at 18 AAC 70.020(b)(14)(D), states that the fecal coliform (FC) bacteria criteria for the harvesting for consumption of raw mollusks or other raw aquatic life require that the geometric mean of samples may not exceed 14 FC/100 mL and not more than 10% of the samples may exceed a FC bacteria most probable number of 43 FC/100mL using the five-tube decimal dilution test.

18 AAC 72.990(21) defines “disinfect” as “producing an effluent with the following characteristics: an arithmetic mean of the values...collected in 30 consecutive days that does not exceed 200 FC bacteria per 100 milliliters; and an arithmetic mean of the values for effluent samples collected in seven consecutive days that does not exceed 400 FC bacteria per 100 milliliters.” Cordova WWTP uses chlorine disinfection. In order to be consistent with the regulatory definition and with other APDES permits for POTWs that provide disinfection, the Department is revising the previous effluent limits for FC bacteria to match the definition of disinfection. A maximum daily effluent limit of 800 FC/100 mL is included as the dilution required by this value is smaller than that required by the chronic ammonia mixing zone. Furthermore, this value is consistent with other APDES permits for POTWs that provide disinfection (see Fact Sheet Section 8.5). The permittee cannot immediately meet these effluent limits, therefore, a compliance schedule with interim reporting requirements is authorized (see Fact Sheet Section 8.5).

#### **B.2.4.6      *Enterococci Bacteria***

Enterococci bacteria are indicator organisms of harmful pathogens recommended by EPA as the best indicator of health risk in marine water used for recreation. In 1986, EPA published Ambient Water Quality Criteria for Bacteria that contained recommended bacteria water quality criteria for primary contact recreational users. The Beaches Environmental Assessment and Coastal Health Act that followed in 2000 required states and territories with coastal recreation waters to adopt bacteria criteria into their WQS, that were at least as protective as EPA’s 1986 published bacteria criteria, by April 10, 2004. Alaska did not adopt the enterococci bacteria into the Alaska WQS by the April 10, 2004 deadline; therefore EPA promulgated the 1986 bacteria criteria for Alaskan coastal recreational waters in 2004.

DEC has proposed new regulatory language at 18 AAC 70.020(b)(14). The change will revise the recommended criteria for marine waters to protect contact recreational uses from FC bacteria to enterococci bacteria. The proposed water quality criteria for enterococci bacteria is a monthly geometric mean of 35 #/100 mL and a statistical threshold value of 130 #/100 mL. The proposed changes to 18 AAC 70 are awaiting EPA approval. The Department reviewed enterococci data from Cordova WWTP and due to a large number of non-detect samples no WQBEL will be calculated, monitoring will be required, and the data will be re-evaluated prior to the next permit issuance.

#### **B.2.4.7      *Total Residual Chlorine***

The most stringent state water quality for TRC to protect designated uses requires that concentrations may not exceed 13 µg/L for acute aquatic life and 7.5 µg/L for chronic aquatic life [18AAC 70.020(b)(23)(c)]. The Department has authorized a mixing zone with a dilution factor of 65 for meeting chronic and acute chlorine criteria. The reasonable



potential analysis in APPENDIX C, takes into account these dilution factors. Based on the WQS of 13 µg/L for protection from acute effects on aquatic life and 7.5 µg/L for protection from chronic effects on aquatic life and on a maximum projected effluent concentration of 90 µg/L, the reasonable potential analysis indicates that TRC does not have reasonable potential to violate WQS at the boundary of the authorized mixing zone. The TRC limits from the previous permit issuance are maintained.

#### **B.2.4.8      *Total Ammonia (as Nitrogen)***

Total ammonia is the sum of ionized and un-ionized ammonia. The unionized form of ammonia is more toxic to aquatic organisms than the ionized form and is more predominate with higher pH and temperature and lower salinity. Because the toxicity of ammonia in marine water is dependent on pH, temperature, and salinity, the water quality criteria are also pH, temperature, and salinity-dependent.

DEC reviewed ambient data collected at a nearby NOAA buoy and data supplied by the applicant to determine applicable temperatures, pH, and salinity to set water quality criteria. Using methods in the APDES Guide, DEC used the 85th percentile for temperature (12.7°C) and pH (8.5) and the average salinity values (26 ppt). The percentiles were chosen to most accurately represent a worst case situation and rounded to most closely match options in the tables in Appendices G and F in *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances*, 2008. These values were rounded to arrive at the acute and chronic criteria located in Table C-1. The acute and chronic criteria for total ammonia are 3.3 and 0.50 mg/L, respectively. Concentration-based WQBELs were calculated for ammonia based on the dilution available in the authorized mixing zone, maximum expected effluent concentration, and water quality criteria.

The permit requires monitoring ambient receiving water body for pH, temperature, salinity, and ammonia to confirm or adjust ammonia water quality criteria used in this determination for the next permit reissuance.

#### **B.2.5      Selection of Most Stringent Limitations**

##### **B.2.5.1      *BOD<sub>5</sub> and Total Suspended Solids***

The permit proposes TBELs for BOD<sub>5</sub> and TSS.

## APPENDIX C. Reasonable Potential Determination

The following describes the process the Alaska Department of Environmental Conservation (DEC or the Department) used to determine if the discharge authorized in the permit has the reasonable potential (RP) to cause or contribute to a violation of Water Quality Standards (WQS). The Department used the process described in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA, 1991) and DEC's guidance, *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis and Effluent Limits Development Guide* (June 30, 2014) (RPA Guidance) to determine RP for any pollutant to exceed a water quality criterion (WQC).

To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of WQC for a given pollutant, the Department compares the maximum projected receiving water body concentration to the criteria for that pollutant. RP to exceed exists if the projected receiving water body concentration exceeds the criteria, and a WQBEL must be included in the permit (18 AAC 83.435).

The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge. For criteria that are expressed as maxima, the 85<sup>th</sup> percentile of the ambient data is generally used as an estimate of the worst-case. If ambient data are not available, DEC uses 15% of the most stringent given pollutant's criteria as a worst-case estimate. Ammonia is provided as an example. In this case, it is assumed that the upstream ambient concentration of ammonia is equal to 0.075 mg/L. This section discusses how the maximum projected receiving waterbody concentration is determined.

### C.1 Mass Balance

For a discharge to a flowing water body, the maximum projected receiving water body concentration is determined using a steady state model represented by the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \quad (\text{Equation C-1})$$

where,

$C_d$  = Receiving water body concentration downstream of the effluent discharge

$C_e$  = Maximum projected effluent concentration

$C_u$  = 85th percentile measured receiving water body upstream concentration (or 15% of the criterion)

$Q_d$  = Receiving water body flow rate downstream of the effluent discharge =  $Q_e + Q_u$

$Q_e$  = Effluent flow rate (set equal to the design flow of the WWTP)

$Q_u$  = Receiving water body low flow rate upstream of the discharge (not applicable)

When the mass balance equation is solved for  $C_d$ , it becomes:

$$C_d = \frac{C_e Q_e + C_u Q_u}{Q_e + Q_u} \quad (\text{Equation C-2})$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream. If a mixing zone based on a percentage of the critical flow in the

receiving stream is authorized based on the assumption of incomplete mixing with the receiving water body, the equation becomes:

$$C_d = \frac{C_e Q_e + C_u (Q_u \times MZ)}{Q_e + (Q_u \times MZ)} \quad (\text{Equation C-3})$$

where MZ is the fraction of the receiving water body flow available for dilution. Where mixing is rapid and complete, MZ is equal to 1 and equation C-2 is equal to equation C-3 (i.e., all of the critical low flow volume is available for mixing).

If a mixing zone is not authorized, dilution is not considered when projecting the receiving water body concentration, and

$$C_d = C_e \quad (\text{Equation C-4})$$

In other words, if a mixing zone is not authorized (either because the stream already exceeds WQS or the Department does not allow one), the Department considers only the concentration of the pollutant in the effluent regardless of the upstream flow and concentration. If the concentration of the pollutant in the effluent is less than the water quality standard, the discharge cannot cause or contribute to a water quality violation for that pollutant. In this case, the mixing or dilution factor (% MZ) is equal to zero and the mass balance equation is simplified to  $C_d = C_e$ .

Equation C-7 can be simplified by introducing a “dilution factor”:

$$D = \frac{Q_e + Q_u}{Q_e} \quad (\text{Equation C-5})$$

After the dilution factor simplification, this becomes:

$$C_d = \frac{(C_e - C_u)}{D} + C_u \quad (\text{Equation C-6})$$

## C.2 Maximum Projected Effluent Concentration

To calculate the maximum projected effluent concentration, the Department used the procedure described in section 3.3 of the *TSD*, “*Determining the Need for Permit Limits with Effluent Monitoring Data.*” In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration which is used in the calculation of the maximum projected receiving water body concentration.

Since there are a limited number of data points available, the 99th percentile is calculated by multiplying the maximum reported effluent concentration by a reasonable potential multiplier (RPM). The RPM is the ratio of the 99th percentile concentration to the maximum reported effluent concentration and accounts for the statistical uncertainty in the effluent data. The RPM is calculated from sample estimates for the mean and standard deviation of the data set and associated normal cumulative distribution functions (equation C-8). When fewer than 10 data points are available, the *TSD* recommends making the assumption that the CV is equal to 0.6. A CV value of 0.6 is a conservative estimate that assumes a relatively high variability.

DEC used ProUCL, a statistical software program maintained by EPA, to determine that the monitoring data submitted for ammonia—a dataset that contains non-detected values—is best modeled using Kaplan-Meier methods. Therefore, the RPM equation in Section 2.4.2.1 of the *APDES Permits*

*Reasonable Potential Analysis and Effluent Limits Development Guide* was used to determine the RPM for ammonia.

$$RPM = \frac{(\hat{\mu}_n + z_{99}\hat{\sigma})}{(\hat{\mu}_n + p_n\hat{\sigma})} \quad (\text{Equation C-7})$$

Where,

$z_{99}$  = the  $z$  – statistic at the 99th percentile = 2.326

$\hat{\mu}_n$  = the sample mean calculated by ProUCL = 3.44

$\hat{\sigma}$  = the sample standard deviation calculated by ProUCL = 4.716

$p_n$  = the inverse of the cumulative distribution function at the 95th confidence level  
 $= (1 - 0.95)^{\frac{1}{n}} = 0.938$   
 $= 1.540$  (inverse of cumulative distribution function of 0.938)

$n$  = the number of valid data samples = 47

In the case of ammonia:

**RPM = 1.345**

The maximum projected effluent concentration is determined by multiplying the maximum reported effluent concentration by the RPM:

$$MEC = (RPM) \times (MRC) \quad (\text{Equation C-8})$$

Where,

MRC = Maximum Reported Concentration

In the case of ammonia,

$MEC = (1.345)(20.7 \text{ mg/L}) = 27.86$  or  $27.9 \text{ mg/L}$  (maximum projected effluent concentration)

### **Comparison with ambient criteria for ammonia**

In order to determine if reasonable potential exists for this discharge to violate the ambient criteria, the highest projected concentrations at the boundary of the mixing zone are compared with the ambient criteria.

Acute       $3.31 \text{ mg/L} > 3.30 \text{ mg/L}$  (acute criteria)    **YES**, there is not a reasonable potential to violate

Chronic:    $0.5 \text{ mg/L} = 0.5 \text{ mg/L}$  (chronic criteria)    **YES**, there is a reasonable potential to violate

Since there is a reasonable potential for the effluent to cause an exceedance of chronic WQS for protection of aquatic life, a WQBEL for ammonia is required. See APPENDIX D for that calculation.

Table C-1 summarizes the data, multipliers, and criteria used to determine reasonable potential to exceed criteria and compares the maximum projected effluent concentrations for the acute and chronic mixing zones to their respective criteria. The most stringent criterion is the lower of the acute and the chronic criteria.

**Table C-1: Reasonable Potential Determination**

<b>Parameter <sup>a</sup></b>	<b>Units</b>	<b>MRC</b>	<b>Number of Samples</b>	<b>Upstream Concentration (C<sub>u</sub>)</b>	<b>Dilution Ratio (D)</b>	<b>RPM</b>	<b>MEC (C<sub>e</sub>)</b>	<b>Maximum Projected Receiving Waterbody Concentration</b>	<b>Water Quality Criteria</b>	<b>Boundary of MZ RP?</b>
Total Residual Chlorine (chronic)	µg/L	90	1,395	0	65	1.0	90	1.38	7.5	No
Total Residual Chlorine (acute)	µg/L	90	1,395	0	8.6	1.0	90	10.47	13	No
Total Ammonia as N (chronic)	mg/L	20.7	47	0.075	65	1.345	27.9	0.50	0.50	Yes
Total Ammonia as N, (acute)	mg/L	20.7	47	0.075	8.6	1.345	27.9	3.31	3.30	Yes

## **APPENDIX D. Effluent Limit Calculation**

If the Alaska Department of Environmental Conservation (the Department or DEC) does not authorize a mixing zone, water quality criteria are applied at the end-of-the-pipe, and technology-based effluent limits (TBELs) are selected for those parameters that are solely technology based.

When DEC authorizes a mixing zone, parameters are identified in the mixing zone that will require dilution to meet water quality criteria. If there are TBELs for an identified parameter in the mixing zone, TBELs apply at the end-of-the-pipe and water quality criteria for that parameter applies at the boundary of the mixing zone. If the reasonable potential analysis (RPA) requires the development of water-quality based effluent limits (WQBELs) for specific parameters in order to protect aquatic life at the boundary of the mixing zone, WQBELs are applied as end-of-pipe effluent limits. Those parameters are not identified in the authorized mixing zone must meet applicable water quality criteria at the end-of-pipe. In the absence of water quality criteria for a particular pollutant—such as for 5-day biochemical oxygen demand and total suspended solids—TBELs are applied as end-of-pipe effluent limits.

In the case of Cordova wastewater treatment plant (WWTP), ammonia demonstrated reasonable potential (RP) to exceed water quality criteria end-of-pipe and required the most dilution to meet water quality criteria at the boundary of the authorized mixing zone. Therefore, the Department developed WQBELs for ammonia.

Once the Department determines that the effluent has a reasonable potential to exceed a water quality criterion, a WQBEL for the pollutant is developed. The Department used the process described in the *Technical Support Document (TSD) for Water Quality-Based Toxics Control* (Environmental Protection Agency, 1991) and DEC's guidance: *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis and Effluent Limits Development Guide* (June 30, 2014) to calculate WQBELs for TRC. The first step in calculating a permit limit is development of a waste load allocation (WLA) for the pollutant.

### **D.1 Mixing Zone-based WLA**

When the Department authorizes a mixing zone for the discharge, the WLA is calculated using the available dilution, background concentrations of the pollutant, and the WQS. Since acute and chronic aquatic life standards apply over different time frames and have different mixing zones, it is not possible to compare the WLAs directly to determine which standard results in the most stringent limits. The acute criteria are applied as a one-hour average and has a smaller mixing zone, while the chronic criteria are applied as a four-day average and has a larger mixing zone. To allow for comparison, long-term average (LTA) loads are calculated from both the acute and chronic WLAs. The most stringent LTA is used to calculate the permit limits.

### **D.2 “End-of-Pipe” WLAs**

In many cases, there is no dilution available, either because the receiving water body exceeds the criteria or because the Department does not authorize a mixing zone for a particular pollutant. When there is no dilution available, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee's discharge does not contribute to an exceedance of the criterion. As with the mixing-zone based WLA, the acute and chronic criteria must be converted to LTAs and compared to determine which one is more stringent. The more stringent LTA is then used to develop permit limits.

### D.3 Permit Limit Derivation

Once the appropriate LTA has been calculated, the Department applies the statistical approach described in Chapter 5 of the *TSD* to calculate maximum daily and average monthly permit limits. This approach takes into account effluent variability [using the Coefficient Variation (CV)], sampling frequency, and the difference in time frames between the average monthly (AML) and maximum daily limits (MDL).

The MDL is based on the CV of the data and the probability basis, while the AML is dependent on these two variables and the monitoring frequency. As recommended in the *TSD*, the Department used a probability basis of 95 percent for AML calculation and 99 percent for the MDL calculation.

The following is a summary of the steps to derive WQBELs from water quality criteria for pollutants that have a reasonable potential to exceed WQS. These steps are found in the Department's *Alaska Pollutant Discharge Elimination System (APDES) Permits Reasonable Potential Analysis and Effluent Limits Development Guide* and the guidance's accompanying Excel Reasonable Potential Analysis Tool. The guidance and tool were used to calculate, RP, the MDL, and the AML for ammonia in Cordova WWTP's permit.

#### **Step 1- Determine the WLA**

The acute and chronic aquatic life criteria are converted to acute and chronic WLAs using the following equations:

$$WLA_{a,c} = C_u + [(WQC_{a,c} - C_u)D_{a,c}]$$

Where:

$D_{a,c}$  = Dilution (acute or chronic)

$C_u$  = Critical upstream concentration

$WLA_{a,c}$  = Wasteload allocation (acute or chronic)

When  $C_u$  is zero, this equation becomes:

$$WLA_{a,c} = WQC_{a,c} \times D_{a,c}$$

For Ammonia:

$$D_a = 8.6$$

$$D_c = 65$$

$$C_u = 0.075 \text{ mg/L}$$

$$WQC_a = 3.3 \text{ mg/L}$$

$$WQC_c = 0.5 \text{ mg/L}$$

$$WLA_a = 27.81 \text{ mg/L}$$

$$WLA_c = 27.70 \text{ mg/L}$$

### **Step 2 - Determine the Long-Term Average (LTA)**

The WLAs are converted to LTAs using multipliers that are derived from equations in Section 5.4 of the TSD:

$$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z_{99}\sigma)$$

$$LTA_c = WLA_c \times \exp(0.5\sigma_4^2 - z_{99}\sigma_4)$$

Where:

$$\hat{\sigma}^2 = \text{square of the standard deviation from ProUCL}$$

$$CV = \frac{\hat{\sigma}}{\hat{\mu}}$$

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma = \sqrt{\sigma^2}$$

$$\sigma_4^2 = \ln\left(\frac{CV^2}{4} + 1\right)$$

$$\sigma_4 = \sqrt{\sigma_4^2}$$

$$z_{99} = \text{the } z - \text{statistic at the 99th percentile} = 2.326$$

For ammonia:

$$LTA_a = 4.32$$

$$LTA_c = 7.94$$

### **Step 3 - Most Limiting LTA**

To protect a water body from both acute and chronic effects, the more limiting of the two LTAs is used to derive the effluent limitations. In the case of ammonia, the  $LTA_a$  is more limiting.

### **Step 4 - Calculate the Permit Limits**

The MDL and the AML are calculated as follows:

$$MDL = LTA \times \exp(z_{99}\sigma - 0.5\sigma^2)$$

Where:

$$z_{99} = \text{the } z - \text{statistic at the 99th percentile} = 2.326$$

$$\hat{\sigma}^2 = \text{square of the standard deviation from ProUCL}$$

$$CV = \frac{\hat{\sigma}}{\hat{\mu}}$$

$$\sigma^2 = \ln(CV^2 + 1)$$



$$\sigma = \sqrt{\sigma^2}$$

$$AML = LTA \times \exp(z_{95}\sigma_n - 0.5\sigma_n^2)$$

Where:

$z_{95}$  = the z – statistic at the 95th percentile = 1.645

$\hat{\sigma}^2$  = square of the logstandard deviation from ProUCL

$$CV = \frac{\hat{\sigma}}{\hat{\mu}}$$

$$\sigma_n^2 = \ln\left(\frac{CV^2}{n} + 1\right)$$

$$\sigma_n = \sqrt{\sigma_n^2}$$

$$n = \text{number} \frac{\text{samples}}{\text{month}} (\text{for ammonia, } n = 4)$$

For ammonia:

$$MDL = 27.81 \frac{mg}{L}$$

$$AML = 9.88 \frac{mg}{L}$$

## APPENDIX E. Mixing Zone Analysis Checklist

### Mixing Zone Authorization Checklist based on Alaska Water Quality Standards (2003)

The purpose of the Mixing Zone Checklist is to guide the permit writer through the mixing zone regulatory requirements to determine if all the mixing zone criteria at 18 AAC 70.240 through 18 AAC 70.270 are satisfied, as well as provide justification to authorize a mixing zone in an APDES permit. In order to authorize a mixing zone, all criteria must be met. The permit writer must document all conclusions in the permit Fact Sheet; however, if the permit writer determines that one criterion cannot be met, then a mixing zone is prohibited, and the permit writer need not include in the Fact Sheet the conclusions for when other criteria were met.

Criteria	Description	Resources	Regulation
Size	Is the mixing zone as small as practicable? <b>Yes</b>	<ul style="list-style-type: none"><li>•Technical Support Document for Water Quality Based Toxics Control</li><li>•Fact Sheet, 5.5.1</li><li>• DEC's RPA Guidance</li><li>• EPA Permit Writers' Manual</li></ul>	<a href="#">18 AAC 70.240 (a)(2)</a> <a href="#">18 AAC 70.245 (b)(1) - (b)(7)</a> <a href="#">18 AAC 70.255(e) (3)</a> <a href="#">18 AAC 70.255 (d)</a>
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? <b>Yes</b>	<ul style="list-style-type: none"><li>•Fact Sheet, 5.5.2</li></ul>	<a href="#">18 AAC 70.240 (a)(3)</a>
Existing use	Does the mixing zone...		

Criteria	Description	Resources	Regulation
	(1) partially or completely eliminate an existing use of the water body outside the mixing zone? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.3	<a href="#">18 AAC 70.245(a)(1)</a>
	(2) impair overall biological integrity of the water body? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.3	<a href="#">18 AAC 70.245(a)(2)</a>
	(3) provide for adequate flushing of the water body to ensure full protection of uses of the water body outside the proposed mixing zone? <b>Yes</b> <b>If no, then mixing zone prohibited.</b>	•Fact Sheet, 5.5.3	<a href="#">18 AAC 70.250(a)(3)</a>
	(4) cause an environmental effect or damage to the ecosystem that the department considers to be so adverse that a mixing zone is not appropriate? <b>No</b> <b>If yes, then mixing zone prohibited.</b>	•Fact Sheet, 5.5.3	<a href="#">18 AAC 70.250(a)(4)</a>
Human consumption	Does the mixing zone...		
	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? <b>No</b> <b>If yes, mixing zone may be reduced in size or prohibited.</b>	•Fact Sheet, 5.5.4	<a href="#">18 AAC 70.250(b)(2)</a>
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? <b>No</b>	•Fact Sheet, 5.5.4	<a href="#">18 AAC 70.250(b)(3)</a>

Criteria	Description	Resources	Regulation
	<b>If yes, mixing zone may be reduced in size or prohibited.</b>		
Spawning Areas	Does the mixing zone...		
	(1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.5	<a href="#">18 AAC 70.255 (h)</a>
Human Health	Does the mixing zone...		
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.6	<a href="#">18 AAC 70.250 (a)(1)</a>
	(2) contain chemicals expected to cause carcinogenic, mutagenic, tetratogenic, or otherwise harmful effects to human health? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.6	
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? <b>No</b>	•Fact Sheet, 5.5.6	<a href="#">18 AAC 70.250(a)(1)(C)</a>

Criteria	Description	Resources	Regulation
	<b>If yes, mixing zone prohibited.</b>		
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? <b>Yes</b> <b>If no, mixing zone prohibited.</b>	•Fact Sheet, 5.5.1	<a href="#">18 AAC 70.255 (b),(c)</a>
	(5) occur in a location where the department determines that a public health hazard reasonably could be expected? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.6	<a href="#">18 AAC 70.255(e)(3)(B)</a>
Aquatic Life	Does the mixing zone...		
	(1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	<a href="#">18 AAC 70.250(a)(2)(A-C)</a>
	(2) form a barrier to migratory species? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	
	(3) fail to provide a zone of passage? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	
	(4) result in undesirable or nuisance aquatic life? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	<a href="#">18 AAC 70.250(b)(1)</a>
	(5) result in permanent or irreparable displacement of indigenous organisms? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	<a href="#">18 AAC 70.255(g)(1)</a>

Criteria	Description	Resources	Regulation
	(6) result in a reduction in fish or shellfish population levels? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.7	<a href="#">18 AAC 70.255(g)(2)</a>
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.1	<a href="#">18 AAC 70.255(b)(1)</a>
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? <b>No</b> <b>If yes, mixing zone prohibited.</b>	•Fact Sheet, 5.5.1	<a href="#">18 AAC 70.255(b)(2)</a>
Endangered Species	Are there threatened or endangered species (T/E spp) at the location of the mixing zone? If yes, are there likely to be adverse effects to T/E spp based on comments received from USFWS or NOAA. <b>No</b> If yes, will conservation measures be included in the permit to avoid adverse effects? <b>Not applicable</b> <b>If yes, explain conservation measures in Fact Sheet. No.</b>	•Fact Sheet, 5.5.8	<a href="#">Program Description, 6.4.1 #5</a> <a href="#">18 AAC 70.250(a)(2)(D)</a>